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What is Claimed is:

1. An isolated and purified growth factor comprising persephin or fragment thereof or conservatively substituted variant thereof.

2. The isolated and purified growth factor of claim 1 comprising a polypeptide sequence which has at least about 75% sequence identity with SEQ ID NO:79, SEQ ID NO:82 or SEQ ID NO:223 or conservatively substituted variants thereof.

3. The isolated and purified growth factor of claim 2 comprising a polypeptide sequence as set forth in SEQ ID NO:187, SEQ ID NO:198, SEQ ID NO:221 or conservatively substituted variants thereof.

4. The isolated and purified growth factor of claim 3 which promotes survival in mesencephalic cells.

5. An isolated and purified polypeptide comprising:

(a) a pre-pro persephin as set forth in SEQ ID NO:217, SEQ ID NO:185, or SEQ ID NO:196;

(b) a prepro- region of persephin as set forth in SEQ ID NO:218, SEQ ID NO:186, or SEQ ID NO:197;

(c) a pre- region of persephin as set forth in SEQ ID NO:219;

(d) a pro- region of persephin as set forth in SEQ ID NO:220; or

(e) conservatively substituted variants thereof.

6. The isolated and purified growth factor of claim 1 comprising a polypeptide containing a sequence of amino acids having at least about 65% sequence identity with SEQ ID NO:79 or SEQ ID NO:82, or SEQ ID NO:223 wherein the growth factor is from a non-mammalian species.

7. A method for obtaining a neurturin-persephin-GDNF family member growth factor comprising:

(a) isolating (1) from a human genomic or cDNA library, a clone that hybridizes with a polynucleotide

5 comprising a persephin, neurturin or GDNF sequence or  
fragments thereof or (2) from a human genomic or cDNA  
template, a clone using a polymerase chain reaction  
method with degenerate primers of a conserved region of  
any two of persephin, neurturin or GDNF or fragments of  
10 said conserved regions; and

(b) sequencing said clone.

8. An isolated and purified growth factor that is  
a neurturin-persephin-GDNF family member comprising a  
polypeptide having between about 30% and about 75%  
sequence identity with persephin, between about 30% and  
5 about 75% sequence identity with neurturin and between  
about 30% and about 75% sequence identity with GDNF  
wherein said factor is comprised of a conserved region  
sequence of amino acids having at least a 62.5 percent  
sequence identity with SEQ ID NO:108 or at least a 62.5  
10 percent sequence identity with SEQ ID NO:109 or at least  
a 50 percent sequence identity with SEQ ID NO:110.

13. A pan-growth factor comprising a fragment of  
the persephin polypeptide according to claim 1 and a  
fragment of at least one growth factor from the TGF- $\beta$   
superfamily other than persephin.

14. An isolated and purified nucleic acid molecule  
or nucleic acid molecule complementary thereto comprising  
a nucleotide sequence encoding a growth factor of claim 1  
or a fragment of said nucleotide sequence consisting of  
5 at least 15 contiguous nucleotides.

15. The isolated and purified nucleic acid  
molecule or nucleic acid molecule complementary thereto  
of claim 14 comprising a nucleotide sequence encoding a  
persephin polypeptide that promotes survival in  
5 mesencephalic cells wherein said nucleic acid molecule or  
complement thereto specifically hybridizes to SEQ ID  
NO:183, SEQ ID NO:184, SEQ ID NO:194, SEQ ID NO:195, SEQ  
ID NO:199, SEQ ID NO:200, SEQ ID NO:201, or SEQ ID  
NO:202.

16. The isolated and purified nucleic acid molecule or nucleic acid molecule complementary thereto of claim 15 comprising SEQ ID NO:183, SEQ ID NO:194, SEQ ID NO:199 or SEQ ID NO:201.

17. A vector comprising expression regulatory elements operably linked to a nucleic acid molecule of claim 14.

18. A host cell transformed with the vector of claim 17.

19. An isolated and purified nucleic acid molecule comprising:

(a) a pre-pro persephin nucleotide sequence as set forth in SEQ ID NO:179, SEQ ID NO:180, SEQ ID NO:190, SEQ ID NO:191, SEQ ID NO:203, SEQ ID NO:204, SEQ ID NO:205, or SEQ ID NO:206 or a polynucleotide that specifically hybridizes to SEQ ID NO:179, SEQ ID NO:180, SEQ ID NO:190, SEQ ID NO:191, SEQ ID NO:203, SEQ ID NO:204, SEQ ID NO:205, or SEQ ID NO:206;

10 (b) a pre-pro region of a persephin polynucleotide as set forth in SEQ ID NO:181, SEQ ID NO:182, SEQ ID NO:192, SEQ ID NO:193, SEQ ID NO:213, SEQ ID NO:214, SEQ ID NO:215, or SEQ ID NO:216;

15 (c) a pre- region of a persephin polynucleotide as set forth in SEQ ID NOS:207, SEQ ID NO:208, SEQ ID NO:209, or SEQ ID NO:210;

(d) a pro- region of a persephin polynucleotide as set forth in SEQ ID NO:211, or SEQ ID NO:212; or

20 (e) fragment thereof comprising at least 15 contiguous nucleotides.

20. A recombinant method comprising:

(a) subcloning a polynucleotide encoding the growth factor of claim 1 into an expression vector comprising regulatory elements operably linked to the polynucleotide;

(b) transforming a host cell with the expression vector;

(c) growing the host cell in a host cell culture;  
and

(d) harvesting the growth factor and/or the polynucleotide from the host cell culture.

21. Isolated and purified antibodies which are capable of reacting with a growth factor as defined in claim 1 or an epitope thereof.

22. A method for detecting the presence of a growth factor in a sample from a patient comprising reacting antibodies according to claim 21 with a growth factor present in the sample and detecting a binding of  
5 the antibodies with the growth factor.

23. A kit for detecting the presence of a growth factor in a sample from a patient comprising antibodies of claim 21 which are capable of detectably reacting with said growth factor, packaged in a container.

24. A method for preventing or treating cellular degeneration or insufficiency in an individual comprising administering to the individual a therapeutically effective amount of the growth factor of claim 1 or a  
5 polynucleotide encoding the growth factor of claim 1.

25. The method of claim 24 wherein the cellular degeneration or insufficiency is (a) neuronal degeneration resulting from peripheral neuropathy, amyotrophic lateral sclerosis, Alzheimer's disease,  
5 Parkinson's disease, Huntington's disease, Ischemic stroke, acute brain injury, acute spinal cord injury, nervous system tumors, multiple sclerosis, or infection; (b) hematopoietic cell degeneration or insufficiency resulting from eosinopenia, basopenia, lymphopenia,  
10 monocytopenia, neutropenia, anemias, thrombocytopenia, or stem-cell insufficiencies therefor; or (c) cardiac muscle degeneration or insufficiency resulting from cardiomyopathy or congestive heart failure.

26. A method for preventing or treating cellular degeneration or insufficiency in an individual comprising

implanting into the individual, cells that express the growth factor of claim 1.

27. A method for detecting the presence of a growth factor in a sample from a patient comprising detecting and/or quantitating the presence in the sample of mRNA encoding a growth factor of claim 1.

28. A method for detecting persephin gene alterations comprising detecting the presence of a non-intact persephin gene in a cell wherein presence of the non-intact gene indicates the presence of gene alterations.

29. A method for promoting the growth and/or differentiation of a cell in a culture medium comprising adding to the culture medium the growth factor of claim 1.

30. An isolated and purified persephin antisense polynucleotide comprising a sequence complementary to a nucleic acid sequence of claim 14 and capable of hybridizing to a naturally-occurring DNA or mRNA polynucleotide sequence encoding persephin to prevent transcription and/or translation of an encoded persephin polypeptide.

31. A method for treating a disease condition mediated by expression of persephin by a population of cells comprising administering to said cells an inhibitory effective amount of the antisense polynucleotide of claim 30.

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